AMENDMENTS TO CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A method for holographic recording comprising:

creating a first hologram in a holographic media using a first reference beam and a first signal beam comprising page-wise data modulated by a spatial light modulator (SLM), the first signal beam having a beam waist;

creating a second hologram using a second reference beam and a second signal beam, the second signal beam having a beam waist;

overlapping at least a portion of the second hologram with the first hologram; and

separating the first hologram from the second hologram such that substantially no portion of the beam waist of the first signal beam occurs at the same location as any portion of beam waist of the second signal beam.

2. (Currently Amended) A method for holographic recording, comprising:

creating a first hologram in a holographic media using a first reference beam and a first signal beam comprising page-wise data modulated by a spatial light modulator (SLM), the first signal beam having a beam waist;

creating a second hologram using a second reference beam and a second signal beam, the second signal beam having a beam waist;

overlapping at least a portion of the second hologram with the first hologram; and

separating the first hologram from the second hologram such that substantially no portion of the beam waist of the first signal beam occurs at the same location as any portion of beam waist of the second signal beam;

reconstructing the first hologram in a first portion of an output beam;

reconstructing at least the second hologram in a second portion of the output beam; and

filtering the output beam to substantially contain only a reconstruction of the first hologram.

3. (Original) The method of claim 2 wherein filtering the output beam includes placing a filter block in the output beam, the filter block having an aperture which allows information from the first hologram to pass through the filter block.

4. (Original) The method of claim 3 wherein:

the first portion of the output beam has a first output waist and the second portion of the output beam has a second output waist; and

filtering the output beam includes:

placing the aperture of the filter block at a location of the first output waist; and

blocking transmission of the second portion of the output beam at the second output waist.

5. (Original) The method of claim 4 wherein one dimension of the aperture is the Nyquist size.

6. (Original) The method of claim 4 wherein one dimension of the aperture is twice the Nyquist size.

7. (Original) The method of claim 2 wherein creating the first hologram includes:

placing a spatial light modulator (SLM) in the path of an incident beam to generate the first signal beam; and

placing a lens in the path of the first signal beam between the SLM and the holographic media.

8. (Original) The method of claim 7 wherein regenerating the first hologram includes using a readout beam to create the output beam wherein the readout beam is the same as the first reference beam.

9. (Original) The method of claim 8 wherein regenerating the first hologram includes using a readout beam to create the output beam, wherein the readout beam is the phase conjugate of the first reference beam.

10. (Original) The method of claim 9 including detecting a readout of the first portion of the output beam in a detector that is integrated with the SLM.

11. (Original) The method of claim 2 wherein creating the first hologram includes:

placing a spatial light modulator (SLM) in the path of an incident beam to generate the first signal beam; and

placing a lens in the path of the incident beam before the incident beam reaches the SLM; and

transmitting the signal beam from the SLM to the holographic media without passing the signal beam through a lens.

12. (Original) The method of claim 11 wherein reconstructing the first hologram includes using a readout beam to create the output beam, wherein the readout beam is the phase conjugate of the first reference beam.

13. (Original) The method of claim 12 including detecting a first portion of the output beam in a detector that is integrated with the SLM.

14. (Original) The method of claim 2 wherein filtering the output beam includes placing an angular filter in the output beam.

15. (Original) The method of claim 14 wherein the angular filter is a layered film.

16. (Previously Presented) The method of claim 14 wherein the angular filter is a holographic optical element (HOE).

17. (Original) The method of claim 14 wherein reconstructing the first hologram includes using a readout beam to create the output beam, wherein the readout beam is the phase conjugate of the first reference beam.

18. (Original) The method of claim 2 including filtering the first signal beam before forming a hologram to limit the bandwidth of the first signal beam.

19. (Original) The method of claim 18 wherein:

filtering the first signal beam includes filtering the signal beam with one of either an angular filter and a filter block; and

filtering the output beam includes filtering the output beam with one of either an angular filter and a filter block.

20. (Original) The method of 2 wherein:

creating the first hologram includes placing a first waist of the first signal beam inside the holographic media; and

creating the second hologram includes placing a first waist of the second signal beam inside the holographic media.

21. (Original) The method of claim 20 including:

generating a second waist of the first signal beam outside the holographic media;

generating a second waist of the output beam outside the holographic media; and

blocking the second portion of the output beam outside the holographic media at the second waist of the output beam.

22. (Original) The method of claim 21 wherein regenerating the first hologram includes using a readout beam to create the output beam wherein the readout beam is the same as the first reference beam.

23. (Original) The method of claim 21 wherein regenerating the first hologram includes using a readout beam to create the output beam, wherein the readout beam is the phase conjugate of the first reference beam.

24. (Original) The method of claim 23 including:

detecting the first portion of the output beam in a detector; and

passing the first portion of the output beam through a waveplate and a polarized beam splitter before detecting the first portion of the output beam.

25. (Original) The method of claim 20 including passing the first object beam through a phase element prior to reaching the holographic media.

26. (Original) The method of claim 2 wherein filtering the output beam includes forming a filter that is integrated with the holographic media, the filter having at least one aperture.

27. (Original) The method of claim 2 including:

locating the holographic media at an image plane of the first signal beam such that the beam waist of the first signal beam is projected into the holographic media;

projecting the first signal beam through a first angular filter before projecting the first signal beam into the holographic media; and

wherein filtering the signal beam includes projecting the output beam through a second angular filter.

28. (Original) The method of claim 27 including generating the output beam using a readout beam that is the same as the first reference beam.

29. (Original) The method of claim 1 including:

multiplexing a first plurality of holograms with the first hologram at a first multiplex location in the holographic media;

multiplexing a second plurality of holograms with the second hologram at a second multiplex location in the holographic media.

30. (Original) The method of claim 29 wherein the first plurality of holograms are angle multiplexed at the first multiplex location and the second plurality of holograms are angle multiplexed at the second multiplex location.

31. (Original) The method of claim 29 wherein the first plurality of holograms are wavelength multiplexed at the first multiplex location and the second plurality of holograms are wavelength multiplexed at the second multiplex location.

32. (Original) The method of 1 wherein:

creating the first hologram includes placing the beam waist of the first signal beam outside the holographic media; and

creating the second hologram includes placing the beam waist of the second signal beam outside the holographic media.

33. (Original) The method of claim 1 including locating the holographic media at an image plane of the first signal beam.

34. (Original) The method of claim 1 locating the holographic media at a Fourier plane of the first signal beam.

35. (Currently amended) A method for reading out a first hologram created in a holographic media from a first signal beam and a first reference beam, the first hologram overlapping in the holographic media with a portion of at least a second hologram created by a second signal beam and a reference beam that is the same as the first reference beam such that substantially no portion of a beam waist of the first signal beam occurs at the same location as any portion of a beam waist of the second signal beam, including:

reconstructing the first hologram in a first portion of an output beam and reconstructing at least the second hologram in a second portion of the output beam; and

filtering the output beam to substantially contain only a reconstruction of the first hologram.

36. (Original) The method of claim 35 including locating the holographic media at an image plane of the first signal beam.

37. (Original) The method of claim 35 locating the holographic media at a Fourier plane of the first signal beam.

38. (Original) The method of claim 2 including:

imaging the first signal beam on a first spot in the holographic medium in a first direction; and

Fourier transforming the first signal beam on the first spot in the holographic medium in a direction orthogonal to the first direction.

39. (Currently amended) An apparatus for hologram recording comprising:

a spatial light modulator (SLM) located in a path of an incident beam to generate a first signal beam; the first signal beam and a first reference beam generating a first hologram in a holographic medium the first signal beam having a first beam waist;

a second signal beam and a second reference beam, the second signal beam and the second reference beam generating a second hologram in a holographic medium the second signal beam having a second beam waist, at least a portion of the first hologram spatially overlapping with at least a portion of the second hologram in the holographic media such that substantially no portion of the waist of the first signal beam occurs in the same location in the holographic media as any portion of the waist of the second signal beam.

40. (Currently amended) An apparatus for recordation a hologram, comprising:

a first signal beam and a first reference beam generating a first hologram in a holographic medium the first signal beam having a first beam waist;

a second signal beam and a second reference beam, the second signal beam and the second reference beam generating a second hologram in a holographic medium the second signal beam

having a second beam waist, at least a portion of the first hologram spatially overlapping with at least a portion of the second hologram in the holographic media such that substantially no portion of the waist of the first signal beam occurs in the same location in the holographic media as any portion of the waist of the second signal beam;

an output beam having:

a first portion that includes a readout of the first hologram; and

a second portion that includes a readout of the second hologram; and

a filter for filtering at least the second portion out of the output beam.

41. (Original) The apparatus of claim 40 wherein the filter includes an opaque filter block having an aperture.

42. (Original) The apparatus of claim 41 wherein:

the first portion of the output beam has a first output waist and the second portion of the output beam has a second output waist; and

in reproducing the first hologram the aperture in the filter block is located at the first output waist and

transmission of the second portion of the output beam is blocked at the second output waist.

43. (Original) The apparatus of claim 42 wherein one dimension of the aperture in the Nyquist size.

44. (Original) The apparatus of claim 42 wherein one dimension of the aperture is twice the Nyquist size.

45. (Currently Amended) The apparatus of claim 40 further including:

a lens located in the path of the first signal beam between [[the]] a spatial light modulator SLM and the holographic media.

46. (Original) The apparatus of claim 45 further including a readout beam that generates the output beam wherein the readout beam is the same as the first reference beam.

47. (Original) The apparatus of claim 45 further including a readout beam that generates the output beam wherein the readout beam is the phase conjugate of the first reference beam.

48. (Original) The apparatus of claim 47 including a detector for detecting the output beam wherein the detector is integrated with the SLM.

49. (Original) The apparatus of claim 40 including:

an incident beam;

a spatial light modulator (SLM) located in the path of an incident beam to generate the first signal beam;

a lens located in the path of the incident beam before the incident beam reaches the SLM such that the signal beam is transmitted directly from the SLM to the holographic media without passing through any lens.

50. (Original) The apparatus of claim 49 including a readout beam to create the output beam, wherein the readout beam is the phase conjugate of the first reference beam.

51. (Original) The apparatus of claim 50 including a detector for detecting the output beam wherein the detector is integrated with the SLM.

52. (Original) The apparatus of claim 40 wherein the filter includes an angular filter.

53. (Original) The apparatus of claim 52 wherein the angular filter is formed from layers of film.

54. (Original) The apparatus of claim 52 wherein the angular filter is formed from an HOE.

55. (Original) The apparatus of claim 52 including a readout beam to generate the output beam wherein the readout beam is the phase conjugate of the first reference beam.

56. (Original) The apparatus of claim 40 including a second filter placed in the first object beam to limit the bandwidth of the first object beam.

57. (Original) The apparatus of claim 56 wherein:

the first filter includes one of either an angular filter and a filter block having an aperture; and

the first filter includes one of either an angular filter and a filter block having an aperture.

58. (Original) The apparatus of claim 40 wherein in forming the first hologram the first beam waist is located inside the holographic media and in forming the second hologram the second beam waist is located inside the holographic media.

59. (Original) The apparatus of claim 58 including:

a second beam waist of the first signal beam, the second beam waist of the first signal beam located outside of the holographic media;

a second beam waist of the output beam, the second beam waist of the output beam located outside the holographic media wherein the second portion of the output beam is blocked at the second beam waist of the output beam.

60. (Original) The apparatus of claim 59 including a readout beam used to generate the output beam, wherein the readout beam is the same as the first reference beam.

61. (Original) The apparatus of claim 59 including a readout beam used to generate the output beam, wherein the readout beam is the phase conjugate of the first reference beam.

62. (Original) The apparatus of claim 61 including:

a detector for detecting the output beam;

a polarized beam splitter located in a path of the output beam before the detector; and

a waveplate located in the path of the output beam before the polarized beam splitter.

63. (Original) The apparatus of claim 58 including a phase element located in a path of the first signal beam before the holographic media.

64. (Original) The apparatus of claim 40 wherein the filter is integrated with the holographic media.

65. (Original) The apparatus of claim 40 wherein the first signal beam includes an image plane that is projected into the holographic media.

66. (Original) The apparatus of claim 65 including a first angular filter located in a path of the first signal beam in front of the holographic media; and the filter includes a second angular filter located in a path of the output beam.

67. (Original) The apparatus of claim 66 including a readout beam that is used to generated the output beam wherein the readout beam is the same as the first reference beam.

68. (Original) The apparatus of claim 39 including:

a first plurality of holograms multiplexed with the first hologram at a location of the first hologram in the holographic media; and

a second plurality of holograms multiplexed with the second hologram at a location of the second hologram in the holographic media.

69. (Original) The method of claim 68 wherein the first plurality of holograms are angle multiplexed at the first multiplex location and the second plurality of holograms are angle multiplexed at the second multiplex location.

70. (Original) The method of claim 68 wherein the first plurality of holograms are wavelength multiplexed at the first multiplex location and the second plurality of holograms are wavelength multiplexed at the second multiplex location.

71. (Original) The apparatus of claim 39 wherein in forming the first hologram the first waist is located outside the holographic media and in forming the second hologram the second waist is located outside the holographic media.

72. (Original) The apparatus of claim 39 wherein an image plane of the first signal beam is projected inside the holographic media.

73. (Original) The apparatus of claim 39 wherein a Fourier plane of the first signal beam is projected inside the holographic media.

74. (Currently amended) An apparatus for reading out a first hologram created in a holographic media from a first signal beam and a reference beam, the first hologram overlapping in the holographic media with a portion of at least a second hologram created by a second signal beam and the reference beam such that substantially no portion of a beam waist of the first signal beam occurs at the same location as any portion of a beam waist of the second signal beam, including:

an output beam having:

a first portion in which the first hologram is read out;

and at least a second portion in which the second hologram is read out; and

a filter in the output beam that filters the output beam to contain substantially only a reconstruction of the first hologram.

75. (Original) The apparatus of claim 74 including locating the holographic media at an image plane of the first signal beam.

76. (Original) The apparatus of claim 74 locating the holographic media at a Fourier plane of the first signal beam.

77. (Currently Amended) The apparatus of claim 39 wherein the first signal beam is imaged at an image plane of the first signal beam in a first direction on a spot in the holographic media and Fourier transformed on the spot in the holographic media in a second direction orthogonal to the first direction.

78. (Currently amended) A holographic media including:

a first plurality of holograms multiplexed with a first hologram at a first location in the holographic media, the first hologram generated by a first signal beam and a first reference beam, the first signal beam having a first beam waist; and

a second plurality of holograms multiplexed with a second hologram at a second location in the holographic media, the second hologram created by a second signal beam and a second reference beam that is the same as the first reference beam the second signal beam having a second beam waist, wherein a portion of the first hologram overlaps with a portion of the second hologram and the first beam waist does not substantially occur at the same location as the second beam waist.

79. (Original) The holographic media of claim 78 wherein the holographic media is in the form of a disk and the first plurality of holograms and the second plurality of holograms are overlapped in a circular formation.

80. (Original) The holographic media of claim 78 wherein the first plurality of holograms and the second plurality of holograms are overlapped in a line.

81. (Original) The holographic media of claim 80 wherein the holographic media is in the form of a card.

82. (Original) The holographic media of claim 80 wherein the holographic media is in the form of a tape.

83. (Original) A method of replicating multiplexed holograms in the holographic media of claim 78 including:

placing a blank holographic media adjacent to the holographic media of claim 78;

projecting a readout beam through the holographic media of claim 78 to generate an output beam, the readout beam being the same as the first reference beam; and

recording at least the first and second holograms into the blank holographic media using the output beam.

84. (Original) The method of claim 1, wherein the second reference beam is the same as the first reference beam.